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GB 2309830 A EP 0735698 A2 EP 0661824 A1  
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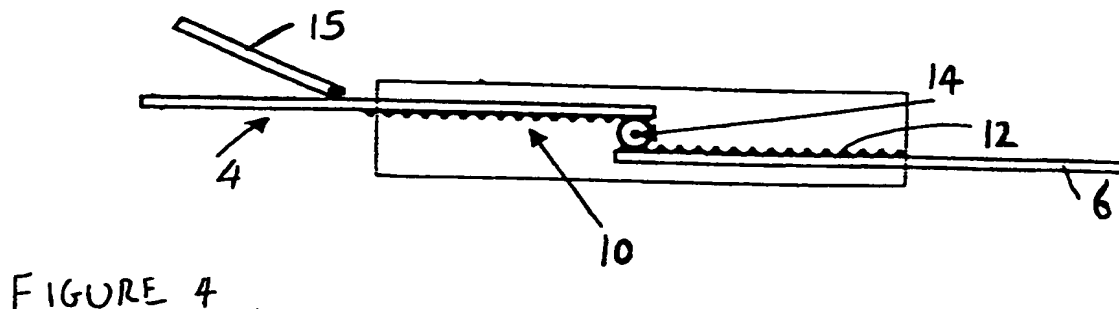
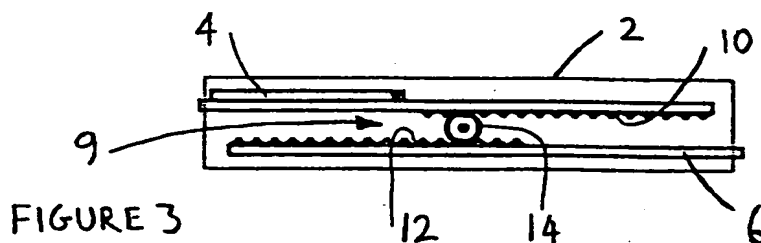
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INT CL<sup>6</sup> H01Q 1/10 1/24, H04B 1/38, H04M 1/02 1/03  
Online: WPI, EPODOC, JAPIO

(54) Abstract Title  
**Telephone handset with at least two movable elements whose motion is linked or is initiated by pushbutton or incoming call**

(57) A telephone handset (1) comprising a stationary element and a plurality of movable elements (4, 6), at least two of the movable elements being movable, relative to the stationary element, between a closed position when the phone (1) is not in use, and an open position when the phone (1) is in use, respectively, whereby moving one of the elements (4) between its closed and open positions causes another of the elements (6) to move between its closed and open positions automatically. In a preferred embodiment, the movable elements (4, 6) comprise a keypad and an antenna respectively of a mobile telephone.

The movable parts may be linked by pulleys, rack and pinion, rollers and friction surfaces or electrical means.

In another embodiment the motion of the movable elements is initiated by pressing a button or receiving a call.



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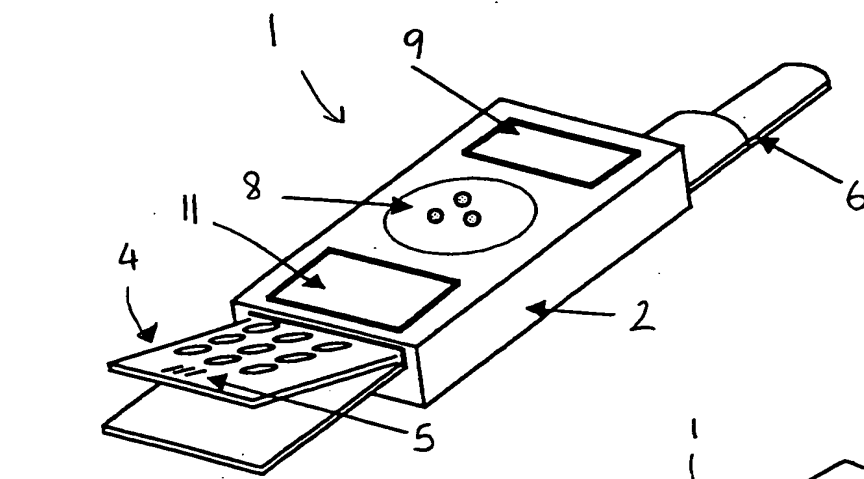


FIGURE 1

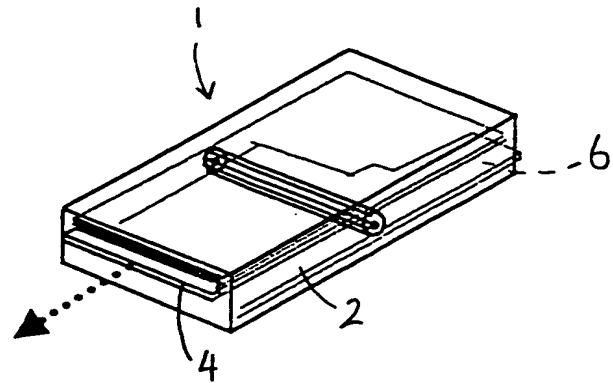


FIGURE 2

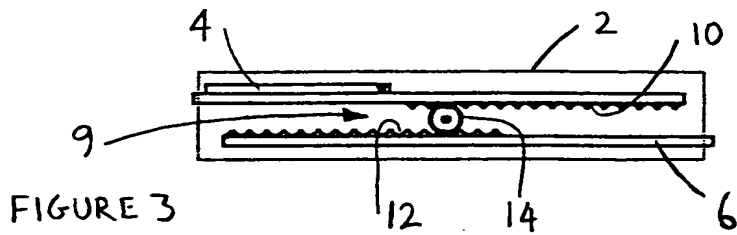


FIGURE 3

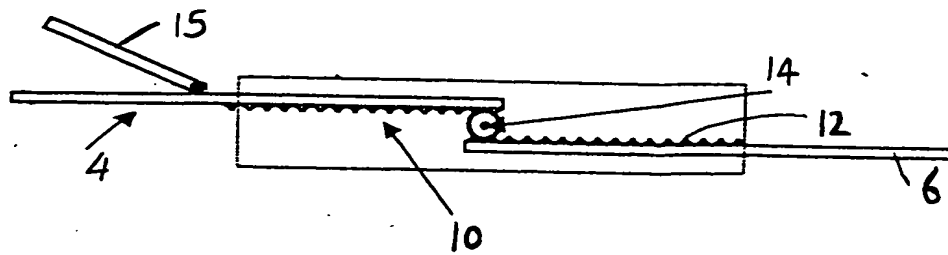


FIGURE 4

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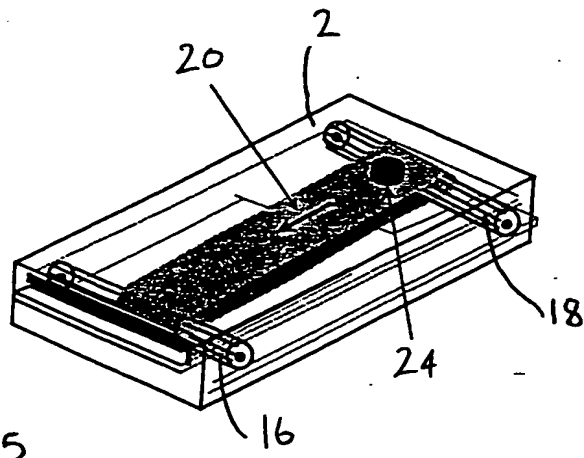


FIGURE 5

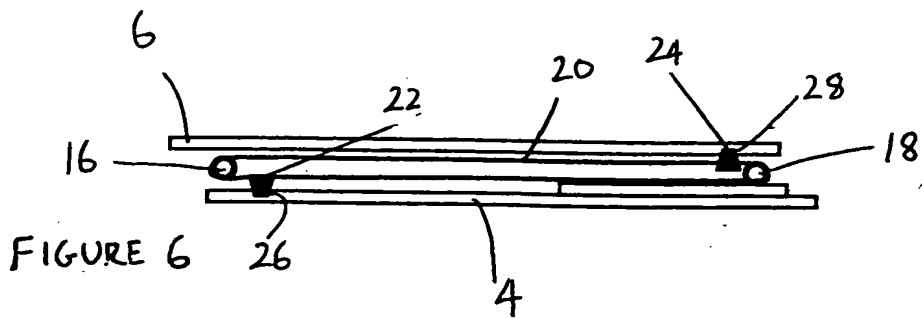


FIGURE 6

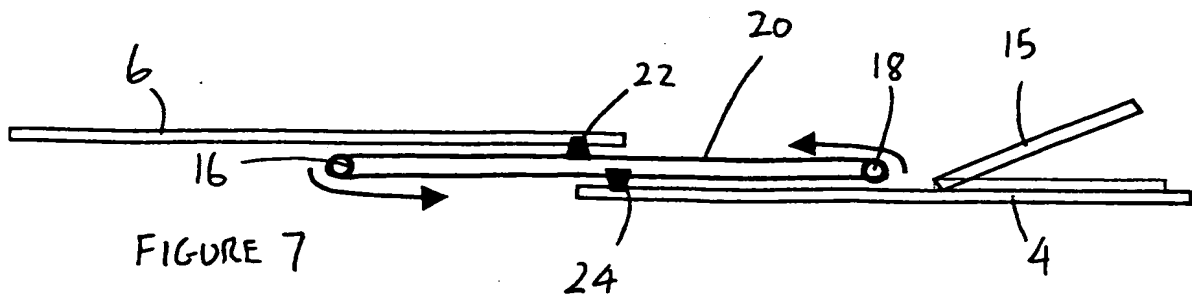


FIGURE 7

STRETCH TELEPHONEField of invention

5           The invention relates to a telephone handset which is compact when not in use, yet is easily deployed into a larger, more user friendly, size when in use.

Background

10           With the continuous size reduction in modern electronics, mobile phones have been shrinking in size. It has now reached a point where the size of the phone is ideal for carrying around. However, while the reduced size makes the phone more convenient to carry,  
15           it does not make the phone comfortable to use.

          Various attempts have been made to produce phones which are compact when not in use, but which are enlarged when being used. For example, mobile phones  
20           are known which have single pivoting or sliding elements that extend the length of the phone when in use.

          Another feature that effects the size of a phone is the antenna. Many phones are known to have antennae  
25           that are stored within the phone when not in use, and deployed when a caller wishes to make or receive a call. An antenna which is stored in this manner has the advantage of reducing the length of the phone for  
30           storage, and also reducing the likelihood of damaging the antenna.

          However, having more than one extendable element



Preferably, the telephone handset further comprises a stationary element, which may comprise a main body of the telephone handset, each movable element being movable between its closed and open positions relative to the stationary element.

Preferably, there is a mechanical interconnection between the movable elements. For example, the movable elements may each have a respective toothed rack and may be interconnected by a rotating pinion which is engaged with the racks, whereby moving the said one movable element between its closed and open positions, causes the pinion to rotate, which in turn causes the said other movable element to move between its closed and open positions. Preferably each rack is integrally formed with a respective movable element.

In an alternative arrangement, the movable elements may each have a respective friction surface and may be frictionally engaged with a rotating wheel or roller, whereby moving the said one movable element between its closed and open positions causes the wheel or roller to rotate which in turn causes the said other movable element to move between its closed and open positions.

Preferably, the friction surfaces are formed from, or coated with, a material or finish having a coefficient of friction which is greater than that of the material from which the movable elements are made.

Preferably, the wheel or roller is provided with a tyre made from a material having a coefficient of friction which is greater than that of the material

**Brief description of the drawings**

For a better understanding of the present  
5 invention and to show how the same may be carried into  
effect reference will now be made, by way of example,  
to the accompanying drawings, in which:-

Figure 1 shows a mobile phone in its open position;

10 Figure 2 is a view of the internal structure of a  
mobile phone in its closed position;

Figure 3 is a diagrammatic representation of a rack and  
15 pinion mechanism of the mobile phone of Figures 1 and 2  
in the closed position;

Figure 4 is a diagrammatic representation of a rack and  
pinion mechanism of the mobile phone of Figures 1 and 2  
20 in the open position;

Figure 5 is a view of the internal structure of an  
alternative embodiment of mobile phone in the closed  
position;

25 Figure 6 is a diagrammatic representation of a belt and  
pulley mechanism of the mobile phone of Figure 5 in the  
closed position; and

30 Figure 7 is a diagrammatic representation of a belt and  
pulley mechanism of the mobile phone of Figure 5 in the  
open position.

single opening operation from the user.

Referring to Figure 4, the keypad 4 is of two part construction and comprises the toothed rack 10 and a flip up keyboard 15 which is hinged to the toothed rack 10, and is resiliently biased to rotate away from the toothed rack 10 by a coil spring (not shown). When the keypad 4 is within the housing 2 of the mobile phone 1, the keyboard 15 is held down against the toothed rack 10. However, as the keypad 4 is withdrawn from the housing, the keyboard 15 is able to gradually pivot away from the toothed rack 10 until abutment of appropriate stops (not shown) limits its pivoting movement. With the keyboard 15 pivoted away from the toothed rack 10, the mouthpiece 5 is placed in a better position relative to a mouth of the user of the phone. A similar arrangement could be used to tilt an earpiece, if this was formed on a movable element of the mobile phone 1.

It will be appreciate that the user may open the phone in the reverse manner by pulling open the antenna 6 rather than the keypad 4. As the antenna 6 is withdrawn from the housing 2, the rack and pinion mechanism will operate to eject the keypad 4 from the housing 2.

In an alternative embodiment (not illustrated), the toothed racks 10, 12 and pinion 14 are replaced by friction surfaces formed on the keypad 4 and the antenna 6 and a corresponding drive wheel or roller. In this simplified embodiment, the driving connection between the keypad 4 and antenna 6 and the drive wheel is a simple friction connection which may be enhanced

housing 2. It will be appreciated that if the second movable element 6 is withdrawn from the housing 2, the first movable element 4 will be ejected in a similar fashion.

5

When the first movable element 4 is within the housing 2 of the mobile phone 1, the keyboard 15 is held down against the first movable element 4. However, as the first movable element 4 is withdrawn from the housing 2, the keyboard 15 is able to gradually pivot away from the first movable element 4 until abutment of appropriate stops (not shown) limits its pivoting movement. With the keyboard 15 pivoted away from the first movable element 4, the mouthpiece 5 is placed in a better position relative to a mouth of a user of the phone.

In an alternative embodiment (not illustrated) an electrical switch or sensor may be provided which is activated by movement of one of the movable elements between its closed and open positions. When activation of the electrical switch or sensor occurs, an electrically powered means such as a motor moves the other movable element between its closed and open positions. In the simplest embodiment, the pinion 14, drive wheel or roller(s) may be driven to rotate by the electric motor in response to activation of the switch or sensor.

In an alternative arrangement (not illustrated) pressing a button or receiving an incoming call triggers the electrically powered means to move the movable elements between their closed and opened positions automatically. For example, the pressing of a button or the receipt of an incoming call may



**CLAIMS**

1. A telephone handset comprising at least two movable elements, which are movable between a closed position when the phone is not in use, and an open position when the phone is in use, means being provided to automatically move one of the movable elements between its closed and open positions, in response to movement of another of the movable elements between its closed and open positions.

2. A telephone handset comprising at least two movable elements, which are movable between a closed position when the phone is not in use, and an open position when the phone is in use, means being provided to automatically move the movable elements between their open and closed positions on receipt of an incoming call or in response to the activation of a switch or button.

3. A telephone handset as claimed in claim 1 or 2, further comprising a stationary element, each movable element being movable between its closed and opened positions relative to the stationary element.

4. A telephone handset as claimed in any one of the preceding claims, in which the said automatic moving means comprises a mechanical interconnection between the movable elements.

5. A telephone handset as claimed in any one of the preceding claims, wherein the movable elements each have a respective toothed rack and are interconnected

other of the movable elements between its closed and open position causes the said one of the movable elements to be pulled, via the band and pulley system, between the closed and open positions.

5

11. A telephone handset as claimed in any one of claims 5 to 10, in which the pinion, wheel, roller or pulley is pivotably connected to a housing of the telephone handset.

10

12. A telephone handset as claimed in any one of the preceding claims, in which the said means comprises an electrical interconnection between the movable elements.

15

13. A telephone handset as claimed in any one of the preceding claims, in which the said automatic moving means comprises an electrical switch or sensor which is activated by movement of the said other element between its closed and opened positions.

20

14. A telephone handset as claimed in claim 13, in which the said automatic moving means further comprises electrically powered means for moving the said one element between its closed and open positions in response to activation of the electrical switch or sensor.

25

15. A telephone handset as claimed in claim 14, in which the electrically powered means comprises an electric motor.

30

16. A telephone handset as claimed in any one of the preceding claims, in which one of the movable



Application No: GB 9912316.8  
Claims searched: 1,3-21

Examiner: Owen Wheeler  
Date of search: 16 August 1999

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): H1Q (QKC) H4J (JK)

Int Cl (Ed.6): H01Q: 1/10, 1/24; H04B: 1/38; H04M: 1/02, 1/03;

Other: Online: WPI, EPODOC, JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2330032 A [NEC] See in particular Figs. 2,3	1,3-6,10-11,16
X	GB 2309830 A [NEC] See in particular Figs. 1,2	1,3-6,10
X	EP 0735698 A2 [NEC] See in particular Figs. 5,6	1,3,4
X	EP 0661824 A1 [NEC] See in particular Figs. 2,3	1,3,4
X	EP 0650282 A1 [AT+T] See in particular Fig. 3	1,3-6,18
X	EP 0624021 A2 [NEC] See in particular Figs. 7-10	1,3-6,10-11
X	US 5166695 A [CHAN] See in particular Fig. 1 and column 2 lines 17-36.	1,3-6
X	JP 020069056 A [MATSUSHITA] See abstract.	1,3,4

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.

E Patent document published on or after, but with priority date earlier than, the filing date of this application.



Application No: GB 9912316.8  
Claims searched: 2

Examiner: Peter Easterfield  
Date of search: 23 November 1999

**Patents Act 1977**  
**Further Search Report under Section 17**

**Databases searched:**

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UK CI (Ed.Q): H1Q (QKC) H4J (JK)  
Int CI (Ed.6): H01Q:1/10, 1/24; H04B:1/38; H04M: 1/02, 1/03;  
Other: Online: WPI, EPODOC, JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2330237 A (ERICSSON)	2,4,5,6,16
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X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.